

3 Supplemental RI Field Investigation Procedures

Supplemental RI fieldwork was carried out from November 2001 through January 2002. The fieldwork was intended to generate data necessary to complete the assessment of the nature and extent of contaminants in soil, groundwater, surface water, and sediments associated with the former BNSF maintenance and fueling facility in Skykomish. This Supplemental RI Report presents the data, together with existing data and information, in a manner which allows BNSF, Ecology, and the public to assess the potential risks to human health and the environment and to develop and evaluate remedial alternatives in an FS for a final cleanup. All investigation activities were conducted in accordance with the 1993 Agreed Order, the Supplemental RI/FS Work Plan (RETEC, 2001a), SAP (RETEC, 1993), and current RETEC Standard Operating Procedures (SOPs) referenced in the Work Plan and SAP.

Table 3-1 summarizes field activities performed during the Supplemental RI. Boring and well construction logs are provided in Appendix A, well construction permits are provided in Appendix B, field forms are provided in Appendix C, and SOPs are provided in Appendix D.

3.1 Drilling Methods

Three drilling methods were used to obtain soil and sediment samples. The drilling method used in each case was determined by the type of sample to be collected (surface soil, sediments, subsurface sediment), depth of boring, location of boring, and the number of samples needed. A total of 32 borings were drilled. A summary of the borings completed during the Supplemental RI is provided in Table 3-2 and the boring locations are shown on Figure 3-1.

3.1.1 Rotosonic

Soil borings were advanced by Boart-Longyear Drilling Company using rotosonic drilling. Rotosonic drilling is commonly used for continuous sampling and monitoring well installation in unconsolidated sand and gravel. The primary benefits of this technique are the high drilling rates combined with reduced volumes of drill cuttings. A rotosonic rig uses an oscillator or head with eccentric weights driven by hydraulic motors to generate high sinusoidal frequency in combination with downward pressure and rotation of a drill pipe. The frequency of vibration (generally between 50 and 120 hertz) of the drill bit or core barrel can be varied to allow optimum penetration of subsurface materials. The drill bit on the end of the core barrel is a steel cylinder with carbide steel nubs impregnated to its leading edge, making it hard enough to core through the occasional granite boulder encountered at this site. With the use of a dual-string assembly, rotosonic drilling can advance a 4-inch-diameter core barrel used to collect the continuous samples ahead of a

6-inch-diameter outer casing used to prevent the hole from caving in while drilling. In order to minimize carry down during drilling operations, the core barrel was washed down while in the drill hole when free LNAPL was encountered. Cores were extruded into 5-foot-long by 8-inch-wide clear plastic bags, on which the driller wrote the sample interval. The bags were laid on the ground in the order they came out on plastic sheeting, and were cut lengthwise using a utility knife. Samples were taken from the cores after they had been logged by the field geologist.

3.1.2 Hand Auger

Shallow surface soil samples were collected using a stainless steel hand auger. A hand auger has a 6-inch-long, 4-inch-inner-diameter bucket attached to a 5-foot-long rod with a “T” handle. Samples were taken by pushing down while turning the hand auger, allowing the flights on the end of the bucket to dig into the ground. Once the bucket was full, it was carefully removed from the hole and its contents were emptied into a decontaminated stainless steel bowl where they were homogenized with a decontaminated stainless steel spoon. Once homogenized, the composite sample was transferred from the stainless steel sampling bowl into one 4-ounce wide-mouth glass jar. After a sample was collected, the material in the bowl was placed in a 55-gallon drum as described in Section 3.8.7 and the hole was backfilled with gravel on the BNSF rail yard and with potting soil outside the rail yard. Soil samples were taken on the BNSF rail yard to an approximate depth of 2 feet and to a depth of 0.5 foot outside the rail yard. Some samples collected from the BNSF rail yard were taken at a depth of 1 foot due to refusal after hitting old railroad ballast in the subsurface.

3.1.3 Acker Drill

The locations chosen for sediment samples along the former Maloney Creek channel were inaccessible by the roto sonic drill rig or any other conventional drill rig. In those instances, a hand-portable Acker drill rig was used to advance the boreholes and obtain the desired samples. The Acker rig is an 8-foot tower mounted on a 4-foot-square base with an engine that moves up and down on the tower. This rig was dismantled for mobilization between each borehole location and reassembled over the following drilling location. The Acker rig was assembled on a sturdy plywood platform that straddled the former creek channel allowing for drilling and sampling of the creek bed sediments in a safe manner.

The tower and base of the Acker rig has a removable set of wheels that allows it to be moved by hand over rough or steep terrain. Once the tower is in place, the engine/gearbox assembly has four removable bars (handles) that allow two persons to carry it down and mount it to the tower. This engine/gearbox assembly moves up and down the tower by use of a hand wheel and gears. The engine is an 8-horsepower, single-cylinder gasoline engine that has a

vertical drive shaft and is bolted on top of the vertical gearbox. The drive shaft coming out the bottom of the gearbox has a universal joint attached to it. This assembly advances 2.25-inch (inner diameter) by 2.5-foot-long hollow-stem augers. This rig will make between a 4.25- and 5-inch boring, depending on consistency of sediments.

The Acker rig used a standard 2-foot-long split spoon sampler (2 inches outer diameter) for soil/sediment logging and sampling. This sampler was advanced on the end of 1.5-inch threaded steel rods by a 140-pound weight acting as the hammer. The hammer was raised to the top of the tower by a rope using a “Cat Head” friction winch. This hammer is dropped on the rods repeatedly, driving the sampler ahead of the augers over the length of the sampler or until refusal is obtained. The number of hammer blows required to advance the sampler 6 inches was recorded and if the number of blows exceeded 50 for 6 inches, the boring was deemed a refusal at that ending depth. If drilling and sampling could not reach 15 feet due to a refusal, up to three attempts per sediment sample station was made. Each attempt was within 2 to 3 feet of each other along or across the creek bed. After each station, the Acker drill was disassembled and moved to the next location.

Refusal was encountered at all sediment locations in the former Maloney Creek channel where the Acker Drill was used. In an effort to collect enough data near the former Maloney Creek channel, Ecology verbally approved a modification of the Supplemental RI work. Three borings on the southern side of the site in Section 2A (Figure 1-2), near the banks of the former Maloney Creek channel, were completed as monitoring wells to determine potential migration pathways at the creek. Borings 2A-B-8, 2A-B-9, and 2A-B-10 were completed as monitoring wells 2A-W-11, 2A-W-9, and 2A-W-10, respectively. The results of groundwater sampling are discussed in Section 8.

3.2 Soil Sampling

Soil samples were obtained from boreholes and surface locations using a roto sonic drill rig or a hand auger. All surface and subsurface soil samples were collected in accordance with the 1993 Agreed Order, Supplemental RI/FS Work Plan (RETEC, 2001a), the SAP (RETEC, 1993), and SOP 210 (Appendix D).

Chemical analysis performed on subsurface soil samples varied depending on the depth and location of the samples. TPH was analyzed at all core locations either by continuously compositing samples from 2.5-foot intervals or by taking samples from discrete zones specified in the Supplemental RI/FS Work Plan. These depths of the discrete sample intervals were determined in the field based on visual observation of the cores, the location of the water table, and the presence of contamination at each location. In addition, PAH; benzene, toluene, ethylbenzene, and xylenes (BTEX); and EPH/VPH

fractionation analysis was performed on (smear zone) samples collected primarily from within the existing LNAPL plume. Finally, samples were collected for analysis of lead and arsenic, PCBs, and dioxins from select intervals. A summary of the soil sampling locations, sample intervals, and analytes is presented in Table 3-3. A figure detailing the soil sampling locations is presented on Figure 3-2.

Surface soil samples were collected for lead and arsenic analysis only. Surface samples were collected from outside the rail yard and railroad property at depths of 0 to 0.5 foot and 0 to 2 feet, respectively. Due to the compactness of the gravels on the rail yard, several surface samples could not be collected using a hand auger and were collected using the roto sonic drill rig. The surface sampling locations on outside the rail yard and railroad property are presented on Figure 3-2.

3.3 Sediment Sampling

Sediment samples were collected from the former Maloney Creek at eight locations during the Supplemental RI fieldwork (Figure 3-3 and Table 3-3). Samples were collected to a depth of 15 feet or refusal (defined as more than 50 blows per 6 inches of split spoon advancement) in 2.5-foot intervals. If refusal occurred, the Acker rig was moved within a 3-foot radius for a new attempt. If refusal was encountered after three attempts, the location was abandoned and sampling considered complete. Samples were taken until no evidence of contamination was observed via visual contamination or odor. If contamination was encountered, a clean sample was collected, if possible, at each location at the base of contamination.

Samples were collected in a decontaminated stainless steel bowl and homogenized with a decontaminated spoon. The samples were transferred to appropriate jars and bottles provided by Analytical Resources, Inc. (ARI). The remainder of each sample was placed in a 55-gallon drum with the boring remains after geological description and sampling was complete.

Prior to the Supplemental RI fieldwork, surface sediment samples were collected from the banks of the Skykomish River on July 10, 2001 from four seep areas (SED-11, SED-12, SED-13, and SED-14), a downstream reference site (SED-10), and an upstream reference station on the opposite riverbank (SED-16) (Table 3-4) (see Section 2.3.17 above). Because the nearshore area is generally accessible only during fall and summer months when the water level and stream flow are low, sediment was collected in the month of July. Water levels as measured at the 5th Street Bridge were no higher than 4.4 feet on July 10 and 3.99 feet on July 19, as indicated in Table 3-5. Accuracy of the ultrasonic sensor at the 5th Street Bridge is likely ± 0.5 foot due to temperature differences on sunny days between the sensor and actual air temperature; however, the water was low enough to provide sufficient access to the nearshore areas where fine sediment generally accumulates.

Sediment samples were collected using stainless steel spoons from each area where maximum depositional or fine material was observed. Multiple spoon grabs were collected from a sampling area, placed into stainless steel bowls, and homogenized until uniform in color and texture. Sediment was collected around the waterline, up to 4 inches above the waterline, and to a depth of 6 inches below the waterline. Fine-grained sediment was collected to a depth of 10 cm where thick roots or rocks did not limit collection, but the average depth was 5.6 cm.

Sampling areas ranged from 10 to 26 feet in length along the riverbank. The number of individual grab locations from each sampling area ranged from two to five. Care was taken to minimize the amount of river water collected and fines lost during submerged sediment sampling. Acceptable sampling locations were confirmed in the field by Peter Adolphson of Ecology prior to sampling. Ecology was on site observing sampling activities and collecting split samples for analyses. Table 3-6 contains the sediment sample descriptions and other sediment collection parameters for each station.

3.4 Monitoring Well Installation

Twenty-five new monitoring wells were installed during the Supplemental RI fieldwork (Figure 3-4) to intercept the water table during all water level fluctuations and thereby detect LNAPL, if present, and to characterize the lateral extent of dissolved contaminants in groundwater. The wells were also used to measure groundwater elevations and determine the direction and gradient of the groundwater flow. Table 3-7 provides the construction details of the wells.

The well locations are shown on Figure 3-4. The wells were constructed in accordance with the Washington State well construction standards (Chapter 173-160 WAC) and construction activities were performed according to the 1993 Agreed Order, RETEC SOP 220 (Appendix D) and the Supplemental RI/FS Work Plan (RETEC, 2001a). Well construction permits are located in Appendix B.

Details of well construction are provided in Table 3-7. Wells installed during the Supplemental RI were constructed with 2-inch-diameter Schedule 40 polyvinyl chloride (PVC) screen and casing. The well screens consisted of 10- or 15-foot sections with 0.020-inch slots and extended from a minimum depth of 6 feet to intercept the water table during seasonal high and low conditions. The filter pack consisted of 10–20 grade sand that was emplaced in the annular space around the screen. The filter pack was placed from the bottom to 1 to 2 feet above the top of the screen interval. The core barrel was vibrated during emplacement of the filter pack to ensure that bridging of the pack did not occur, and care was taken when the filter pack was emplaced to ensure that there was always sand inside the base of the casing and native formation could not cave directly around the screen. A bentonite seal was

placed above the filter pack and occasionally below the filter pack as a backfill material. The seal consisted of 0.375-inch bentonite chips and was at least 1.5 feet thick. Due to concerns of frost heaving, 4 feet of ready-mix concrete was added from the top of the bentonite seal to, in most cases, the ground surface. For the wells located in the streets, 2 to 3 inches of Jet Set quick-setting cement with black dye was poured on top of the concrete for a harder and less noticeable monument. The wells were either completed with a 4-inch-diameter, 5-foot-long steel stickup monument (set approximately 3 feet deep) with three bollard posts on the rail yard, a heavy duty steel flush-mount waterproof monument cap in the streets, or a regular standard flush-mount monument cap outside the rail yard.

3.5 Monitoring Well Development

Upon completion of the Supplemental RI wells, each well was developed by pumping and surging. Well development clears the screened intervals of silt and mud allowing groundwater and free LNAPL (if present) to readily flow through the screens. The equipment used in development consisted of: (1) a 0.75-horsepower aboveground electric pump, (2) a portable gas generator with 240-volt capability, (3) a 1-inch Schedule 40 PVC pipe with a removable brass check valve and a rubber surge block, (4) a 425-gallon poly tank on a trailer, and (5) a 1-inch braided hose for suction and return.

3.5.1 Surging

Well development was performed using the following methods. Each well was first surged in order to force water in and out of the screen and sand pack. Surging involved lowering the 1-inch PVC pipe with a rubber surge block mounted on the end into the well and then manually raising and lowering the pipe in the well at a rapid rate. This method also stirs up the silt and sand that has settled to the bottom of the well since its installation.

3.5.2 Pumping

Once the water column in the well was stirred up, the pipe was taken out of the well and the surge block was replaced with a brass check valve. This assembly was then lowered back into the well to within a foot above the bottom and secured at the wellhead. The pipe was filled with water; a hose was attached from the pump to the top of the pipe, and from the pump to the water tank. The pump was then manually primed with all of the hoses attached and ball valve opened on return end of the pump using the check valve. After the system was primed, the generator was started and the circuit breaker was switched to the "on" position. The pump would then pull the water out of the well at a rate controlled by the ball valve. Depending on the rate of pumping, the water coming out of the well would eventually become clear indicating that water was beginning to flow into the well from the formation. The PVC pipe would then be manually raised and lowered in the

well with the pump still operating in order to stir up the sediment in the screen.

If there was a significant amount of silt mixed with the water being pumped out of the well, the pump was turned off and the well was resurged and pumped until the silt content was decreased. These wells typically had a poor recharge rate at the beginning of development, which increased as more silt was pumped out of the well. If the water cleared up almost immediately, the well was continually pumped until no more silt could be stirred up. These wells typically had a recharge rate greater than that of the maximum pumping rate (approximately 10 to 13 gallons per minute [gpm]). On average, approximately 300 gallons were removed from each well during development.

Water quality parameters (pH, temperature, and conductivity) were monitored during well development using a Horriba U-22 water quality multimeter. Measurements were taken at approximately 100-gallon intervals until no change was observed in the parameters for three consecutive measurements. At that point, each well was considered stabilized and no further development was necessary.

3.6 Groundwater Sampling

Groundwater samples were collected from 51 wells during the Supplemental RI: 32 existing wells and 19 of the 25 new wells (Figure 3-4). Sampling was completed using low-flow sampling techniques in accordance with Section 2.5.2 of the SAP (RETEC, 1993) and RETEC SOP 230 (Appendix D). All samples were collected by pumping water from the middle of the well screen. A summary of the wells sampled and analyses performed are presented in Table 3-8. Groundwater sampling forms for each location were completed at the time of sampling, and are attached in Appendix C.

Prior to sampling, each well was evaluated for the presence of LNAPL. Only one of the 51 monitoring wells sampled during the Supplemental RI (5-W-2) had LNAPL present. A modified low-flow technique was used in this well to collect a groundwater sample from beneath the LNAPL. Due to the viscous nature of the LNAPL, the polyethylene tubing could plug. To prevent plugging, the peristaltic pump was reversed to blow air through the end of the tubing and a small amount of distilled, deionized water was reversed through the tubing. After the tubing was cleared, a sample was collected using a lowered flow rate (approximately 100 milliliters per minute [ml/min]) to ensure that no LNAPL would be entrained with the groundwater. No groundwater physical parameters were collected from this sampling location.

Sample preservation, handling and analysis were conducted in accordance with SOP 110 (Appendix D) and Section 3 of the SAP (RETEC, 1993) and the Supplemental RI/FS Work Plan (RETEC, 2001a). All samples were

submitted to ARI in Seattle, Washington for analysis. A summary of analytical methods and reporting limits is discussed in Section 4 (Table 4-2).

3.7 Fluid Level Gauging

Busch, Roed and Hitchings, Inc. surveyed the new wells and river levels between January 31 and February 4, 2002 using Global Positioning System (GPS) and conventional methods. The former Maloney Creek channel was surveyed on February 12, 2002. The depth to water in wells known to be free of LNAPL was measured using an oil/water interface probe and/or a measuring tape with water-finding paste. Wells known to contain LNAPL were measured for depth to product using a measuring tape. LNAPL thickness was measured using the site-specific approach as described in the Supplemental RI/FS Work Plan (RETEC, 2001a). A discussion of fluid level gauging results appears in Section 6, the results are listed in Table 6-1, and a groundwater elevation contour map for January 31 and February 1, 2002 appears on Figure 6-11.

Due to extensive snow cover during fluid level gauging, measurements took an unusually long time (5 days). Hence, measurements from 2 of the 5 days were used to create the groundwater elevation contour map. January 31 and February 1 were chosen as the days to use for the groundwater elevation contour map because the weather was favorable and many wells could be gauged on those days. An LNAPL thickness map using data from the entire gauging event is presented with the discussion of groundwater monitoring results in Section 8 (Figure 8-1). Field forms from groundwater gauging are in Appendix C.

3.8 Additional Field Procedures

3.8.1 Utility Clearances

Prior to any subsurface activities, all boring and well locations were cleared for underground utilities. The Washington State "One Call" utility locating service was contacted for clearance of utilities on public lands. RETEC personnel met the locators on site and received clearance on all locations for power, gas, cable, and telephone as they were all determined to be overhead or non-existing. An underground fiber optic cable was located and marked through and adjacent to the Old Cascade Highway. Sample 3-B-3 was offset several feet to avoid the fiber optic cable. Maps of the undergroundwater and storm drain lines were obtained and confirmed with Skykomish maintenance personnel. Applied Professional Services (APS) was contacted and met on site to locate utilities on private property and the rail yard. Septic tanks and drain fields were located with the assistance of the land/home owners. In addition, RETEC contacted the King County Department of Health to obtain any as-built designs or other information about septic tank and drain field locations.

During subsurface activities, all boring and well locations were hand-cleared to a depth of approximately 3 feet bgs or until native geologic materials were encountered. No subsurface utilities were encountered during the Supplemental RI fieldwork.

3.8.2 Access Agreements

EnviroIssues worked with local residents and property owners to obtain written or verbal access agreements for collecting soil samples, installing wells, and drilling boreholes on private property and on town or school property.

Based on a preliminary map of sample locations approved by Ecology, EnviroIssues contacted residents to request permission to obtain surface soil samples, borehole samples and wells. Where necessary, written access agreements were signed by both BNSF and the property owner. Whenever possible, EnviroIssues staff also met with the property owner to explain the sampling process and answer questions about the sampling and the use of data being collected. When meeting in person was not possible, other forms of communication were used (i.e., phone calls, letters, and e-mail messages). Since a number of the sample locations were on town and school property, EnviroIssues worked closely with the Town Council and School Board to obtain permission for the sampling and to coordinate the sampling efforts. In total, EnviroIssues obtained permission for 49 surface samples, 10 boreholes, and 18 wells. Following verbal or written approval from the property owners, EnviroIssues coordinated the schedule for sample collection with the property owner and RETEC.

A few property owners did not permit access for sampling or the owner could not be located. In most of those cases, the sampling was relocated to an area where access was available. In some of those cases, after conferring with Ecology, samples were not collected.

3.8.3 Equipment Calibration

All field equipment was calibrated to manufacturers' specifications prior to use.

3.8.4 Field Activity Documentation

Field activity logs were maintained by RETEC personnel to document field activities. Logs included but were not limited to the following:

- **Field Activity Log:** Field activity logs were completed to describe general site activity, changes in the Work Plan, and personnel present on the site (Appendix C).

- **Site Safety Meeting Forms:** Daily site safety meeting forms were completed to describe daily work activities, changing site conditions, or concerns of personnel as related to health and safety (Appendix C).
- **Boring Logs and Well Completion Logs:** Boring logs were completed by a field geologist for all wells and borings completed at the time of drilling. Boring logs describe date and time, geologic material encountered during drilling with depth, visual and olfactory observations, sampling information, and well completion data (Appendix A). The well development was documented on well development logs in order to record well condition, development methods, and equipment. The volume of water purged at regular intervals was recorded along with the field measurements of groundwater parameters. These parameters were measured to allow the field technician to determine if the well had achieved stabilization of formation groundwater in the well (Appendix C).
- **Sampling Logs:** Groundwater sampling logs were completed by field personnel for all sampled wells and soil/sediment sampling logs were completed for all such samples collected at the site. The sampling log describes date and time of sampling, sampling method, field measurements (e.g., groundwater parameters), and sampling information (Appendix C).

3.8.5 Field Quality Assurance Sampling

Quality assurance sampling (Table 3-9) was completed in accordance with the SAP (RETEC, 1993), Supplemental RI/FS Work Plan (RETEC, 2001a) and 1993 Agreed Order. Quality assurance sampling included the following:

- **Trip Blanks:** Trip blanks were prepared in advance by the contracted laboratory (ARI) by filling representative glassware with known deionized water. One trip blank was added to all coolers containing soil or water volatile organic compound (VOC) samples.
- **Field Duplicates:** Field duplicates were collected for soil and water samples at a rate of at least one sample in every 10. Soil duplicates were collected from a homogenized parent sample. Field duplicates were not identified as duplicates on the sample labels or chain-of-custody forms but were identified as such in the field logs.
- **Equipment Blanks:** Equipment blanks were taken on all decontaminated sampling equipment at a rate of at least one sample in every 20. Equipment blanks were taken by rinsing the sampling equipment with deionized water (holding tank water was used for the coring barrel blank) into the representative sample container.

Equipment blanks were taken on stainless steel bowls and spoons, the hand auger, plastic zipper bags, and the coring barrel.

3.8.6 Decontamination

All sampling tools and equipment were decontaminated in accordance with the Supplemental RI/FS Work Plan (RETEC, 2001a) and SOP 120 (Appendix D). Sample tools consisted of hand augers, stainless steel bowls, stainless steel spoons, split spoon samplers (Acker Rig), and a steel trowel. Sampling tools were decontaminated using three 5-gallon buckets consisting of a gross rinse, an Alconox bath, a clean water rinse, and a final rinse with a deionized water sprayer. When the tools were contaminated with LNAPL, over-the-counter degreasers such as Simple Green or Orange Citrus were used to cut through the bunker C during the gross rinse stage.

The drill rig was decontaminated at the end of every day along with the drilling steel using a hot-water pressure washer and degreaser soap. The drill rig and drilling steel were decontaminated on a bermed area that was constructed in the rail yard and was large enough to wash the entire drill rig and contain all water spray.

3.8.7 Management of Investigation-Derived Waste

The Supplemental RI fieldwork generated potentially-contaminated environmental media, such as soil from boreholes and groundwater from wells. All media generated during the Supplemental RI field activities was contained either in 55-gallon drums or a 21,000-gallon baker tank pending laboratory analysis necessary for proper treatment or disposal.

All soil was drummed and labeled for proper disposal as non-hazardous waste, and the water generated from decontamination of the rig and drilling tools and from well development and purging was pumped into the baker tank. Other potentially contaminated waste that was generated during the investigation consisted of plastic bags and sheeting, nitrile gloves, plastic Ziploc bags, polyethylene tubing, 1-inch PVC pipe, sorbent pads, and paper towels. All trash was bagged up and placed in drums to be handled as non-hazardous waste.

Pacific Industrial Resources (PIR) removed the water in the baker tank in 3,000-gallon truckloads. Once field activities ended, PIR decontaminated the baker tank on site before the tank's removal. PIR also handled all drums, sending each type of waste to the proper treatment or disposal facility.

3.8.8 Sample Location Surveying

Initial sample location surveying was completed with a Trimble GPS unit. This unit allowed RETEC personnel to locate each Supplemental RI boring, well, sediment sample, and soil sample location to plus or minus 0.5 meter of

accuracy. Some of the locations were moved due to field conditions, such as overhead utilities, underground utilities, and access. Changes in sample locations were discussed with Ecology and recorded to allow maps to be updated upon completion of field activities.

Busch, Roed and Hitchings, Inc., using GPS and conventional methods completed final surveying. Surveying of the wells and river levels took place between January 31 and February 4, 2002. The former Maloney Creek channel was surveyed on February 12, 2002.

3.8.9 Borehole Abandonment

All boreholes that were not completed as wells were abandoned using the following method. The core barrel was lowered to the bottom of the hole and was unthreaded from the sonic head to keep the hole open and allow for 0.375-inch bentonite chips to be poured all the way to the bottom. While the bentonite pellets were poured into the borehole, the drill helper poured some water in the top of the casing to prevent the bentonite from bridging. After a few bags of bentonite were emplaced, the driller reconnected the core barrel and turned on the sonic head while retracting the casing in the borehole. This method used the vibratory capability of the roto-sonic rig to consolidate the chips, making a good seal. Once the core barrel was retracted almost to the top of the bentonite, it was disconnected again and more chips were poured in. This process was repeated until the entire core barrel was out of the ground and the bentonite reached the ground surface. In paved areas, a concrete pad was poured over the borehole to approximately 2 feet bgs.

3.9 Health and Safety

All personnel working on site followed Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120, RETEC's *Site-Specific Health and Safety Plan* (ThermoRetec, 2001b), and, when on the rail yard, BNSF's On-Track Safety Program Requirements. The safety and health officer for the Supplemental RI fieldwork was responsible for briefing new personnel on health and safety protocols and confirming they had reviewed and signed the Safety Plan Acknowledgement Form prior to beginning any fieldwork. In addition, all personnel were required to fill out a Safety Task Analysis Review (STAR) form detailing all tasks and risks to be performed throughout the project.

Health and safety meetings were held on a daily basis throughout the duration of the fieldwork. These meetings were conducted to inform all personnel of changing site conditions, to review STAR forms, to present pertinent safety topics, and to address any worker health and safety concerns.

Special emphasis was placed on controlling access to work areas. Exclusion zones for wells and borings completed in public areas were clearly defined

using street cones. In addition, RETEC personnel would intercept any individuals attempting to enter the exclusion zone without proper training and authorization.

Table 3-1 Summary of Draft RI, Supplemental RI, and Other Investigation Activities

Project Phase	Date	Investigation Activity
Pre-RI Investigations	1973–1974	5 test pits excavated 3 monitoring wells (apparently destroyed in 1980)
	1990–1992	Removal of 2 USTs 9 surface samples (SS-1 to SS-3 and SS-6 to SS-11) 3 soil borings (B1 to B3) 32 monitoring wells (MW-1 to MW-32) 1 sediment sample (SKY-1) 2 test pits (TP-1 and TP-2)
Draft RI	1993–1995	4 hand auger samples (HA-1 to HA-4) 32 surface soil samples (SS-13 to SS-32, BG-1 and BG-2) 9 soil borings (B-4 to B-12) 8 shallow monitoring wells (MW-33 to MW-40) 5 deep monitoring wells (DW-1 to DW-5) >100 groundwater samples 7 sediment samples (SED-1 to SED-7) 7 surface water samples (SW-1 to SW-7)
Miscellaneous Investigations	1995–1996	5 step-out borings, two were completed as monitoring wells (SO-1 to SO-5, MW-42 and MW-43) 2 culvert borings (NC-1 and OC-1) Blood lead level testing at Skykomish School 7 quarterly background metals groundwater samples 4 recovery wells (R-1 to R-4) 6 quarterly groundwater samples (MW-16, MW-19, MW-37, MW-35, DW-5 and MW-43)
	1996–1997	water supply testing by health department 2 sediment samples (SS-50 and SS-51) Site-wide groundwater sampling Semiannual groundwater sampling
	1997–1999	7 indoor air samples semiannual groundwater sampling 8 test pits for soil TPH fractionation analysis wildlife/ecological evaluation by Ecology 10 background metals surface soil samples (BG-101 to BG-110)
	1999–2000	4 groundwater samples from beneath LNAPL (MW-8, MW-25 and MW-36) Site-wide groundwater sampling Site-wide LNAPL thickness gauging Voluntary benthic infaunal analysis (Report not included in RI Report)
	2001–2002	6 sediment samples for toxicity testing and benthic infaunal analysis (SED-10 to SED-14, SED-160) garden sampling from 6 locations 28 monitoring wells (1A-W-1 to 1A-W-4, 1B-W-1 to 1B-W-3, 1C-W-1 to 1C-W-2, 2A-W-1 to 2A-W-11, 2B-W-4, 5-W-1 to 5-W-4, and MW-44 to MW-46) 4 piezometer wells (PZ-1 and PZ-3 to PZ-5) 1 recovery well (RW-8) 32 soil borings (2A-B-1 to 2A-B-9, 2A-B-11 to 2A-B-19, 2B-B-1 to 2B-B-2, 2B-B-4 to 2B-B-5, 3-B-1 to 3-B-3, 5-B-1 to 5-B-6) 8 sediment samples (2B-SD-1 to 2B-SD-6, 3-SD-1, 5-SD-1) 139 hand auger surface samples (1A-SS-1 to 1A-SS-5, 1B-SS-3 to 1B-SS-8, 1C-SS-1 to 1C-SS-11, 1C-SS-14, 2B-SS-3, 2B-SS-5, 2B-SS-6, 3-SS-2, 4-SS-1, 4-SS-3 to 4-SS-5, 4-SS-7 to 4-SS-9, 5-SS-1 to 5-SS-11, 5-SS-13 to 5-SS-17, 2A-GS-27 to 2A-GS-92, 4-GS-9 to 4-GS-26, 5-GS-1 to 5-GS-8) 57 groundwater samples

Table 3-2 Boring Completion Summary

Boring Name	Date Installed	Ground Surface Elevation (ft-msl)	Total Boring Depth (ft)	Boring Diameter (in)	Seal Material	Depth to Water during Installation (ft)
December 2001–January 2002						
2A-B-1	12/16/01	934.5	20	4.5	3/8" Bentonite Chips	8
2A-B-2	12/16/01	934.5	20	4.5	3/8" Bentonite Chips	7
2A-B-3	12/16/01	934.5	20	4.5	3/8" Bentonite Chips	8
2A-B-4	12/16/01	934.5	20	4.5	3/8" Bentonite Chips	7
2A-B-5	12/11/01	933.5	20	4.5	3/8" Bentonite Chips	9.5
2A-B-6	12/05/01	934	30	4.5	3/8" Bentonite Chips	7
2A-B-7	12/06/01	932	20	4.5	3/8" Bentonite Chips	8
2A-B-8	12/13/01	930.5	15	4.5	3/8" Bentonite Chips	3.5
2A-B-9	12/13/01	933	15	4.5	3/8" Bentonite Chips	10
2A-B-11	12/14/01	936.5	22	4.5	3/8" Bentonite Chips	11.5
2A-B-12	12/14/01	935.5	22	4.5	3/8" Bentonite Chips	8.5
2A-B-13	12/10/01	937	20	4.5	3/8" Bentonite Chips	7.5
2A-B-14	12/10/01	939	15	4.5	3/8" Bentonite Chips	10
2A-B-15	12/11/01	939	15	4.5	3/8" Bentonite Chips	10
2A-B-16	12/11/01	939	25	4.5	3/8" Bentonite Chips	10
2A-B-17	12/03/01	937.5	22	4.5	3/8" Bentonite Chips	9
2A-B-18	12/04/01	939	21	4.5	3/8" Bentonite Chips	10
2A-B-19	12/18/01	940	20	4.5	3/8" Bentonite Chips	6
2B-B-1	12/08/01	933	15	4.5	3/8" Bentonite Chips	5
2B-B-2	12/19/01	949	20	4.5	3/8" Bentonite Chips	9.5
2B-B-4	12/07/01	931	6.5	4.5	3/8" Bentonite Chips	1
2B-B-5	12/10/01	937	15	4.5	3/8" Bentonite Chips	9
3-B-1	12/17/01	930	15	4.5	3/8" Bentonite Chips	6
3-B-2	12/14/01	933.5	15	4.5	3/8" Bentonite Chips	8
3-B-3	12/10/01	933.5	20	4.5	3/8" Bentonite Chips	11
4-B-1	12/08/01	933	15	4.5	3/8" Bentonite Chips	5.5
5-B-1	12/03/01	930	19	4.5	3/8" Bentonite Chips	8
5-B-2	12/14/01	934	22	4.5	3/8" Bentonite Chips	10
5-B-3	12/15/01	923	18	4.5	3/8" Bentonite Chips	4.5
5-B-4	12/03/01	919.5	15	4.5	3/8" Bentonite Chips	1.5
5-B-5	12/18/01	921	20	4.5	3/8" Bentonite Chips	3
5-B-6	12/18/01	933.5	20	4.5	3/8" Bentonite Chips	5.5

Note:

ft-msl - Feet above mean sea level.

Table 3-3 Soil and Sediment Sampling Summary

Sample Location ID	Sampling Details																
	Surface				Vadose				Smear Zone								Below Smear Zone
	Pb, As	NWTPH-Dx	Dioxins	PCB	Pb, As	NWTPH-Dx	PCB	TOC	Pb, As	NWTPH-Dx	PAH	BTEX	EPH/VPH	PCB	Pb, As	NWTPH-Dx	PCB
Section 1A																	
1A-W-1 (****)	X	—	—	X	—	X	—	—	—	X	—	—	—	—	—	X	—
1A-W-2	X	—	—	—	—	—	—	—	—	X	X	X	X	—	—	—	—
1A-W-3	X	—	—	—	—	—	—	—	—	X	—	—	—	—	—	X	—
1A-W-4	X	—	—	—	—	—	—	—	—	X	X	X	X	X	—	X	—
1A-SS-1	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1A-SS-2	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1A-SS-3	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1A-SS-4	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1A-SS-5	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Section 1B																	
1B-W-1	X	—	—	—	—	—	—	—	—	X	X	X	X	X	—	X	—
1B-W-2	X	—	—	—	—	—	—	—	—	X	X	X	X	X	—	X	—
1B-W-3 (*)	—	—	—	—	—	—	X	—	—	X	—	—	—	—	—	X	—
1B-SS-3	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1B-SS-4	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1B-SS-5	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1B-SS-6	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1B-SS-7	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1B-SS-8	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Section 1C																	
1C-W-1	—	X	—	—	—	—	—	X	—	X	X	—	X	—	—	X	—
1C-W-2	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	X	—
1C-SS-1	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-2	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-3	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-4	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-5	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-6	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-7	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-8	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-9	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-10	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-11	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-14	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1C-SS-50	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Section 2A																	
2A-B-1 (****)	X	—	—	X	—	—	X	—	—	—	—	—	—	—	—	—	X
2A-B-2 (****)	X	—	—	X	—	—	X	—	—	—	—	—	—	X	—	—	X
2A-B-3 (****)	—	—	—	X	—	—	X	—	—	—	—	—	—	X	—	—	X
2A-B-4 (****)	—	—	—	X	—	—	X	—	—	—	—	—	—	X	—	—	X
2A-B-5	X	X	—	—	X	X	—	—	—	X	X	X	X	—	—	—	—
2A-B-6	X	X	—	—	X	X	—	—	—	X	X	—	X	—	—	X	—
2A-B-7	X	X	—	—	X	—	—	—	—	X	X	X	X	—	—	X	—
2A-B-8	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	X	—
2A-B-9	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	X	—
2A-B-11	—	X	—	—	—	X	—	—	—	X	X	X	X	—	—	X	—
2A-B-12	—	X	—	—	—	—	—	—	—	X	—	—	—	—	—	X	—
2A-B-13	—	X	—	—	—	X	—	—	—	X	X	X	X	—	—	X	—
2A-B-14	—	X	—	—	—	X	—	—	—	X	X	X	X	—	—	—	—
2A-B-15	—	X	—	—	—	—	—	—	—	X	X	X	X	—	—	X	—
2A-B-16	—	X	—	—	—	X	—	—	—	X	X	X	X	—	—	X	—
2A-B-17	—	X	—	—	—	X	—	—	—	X	—	—	—	—	—	X	—
2A-B-18 (*)	—	X	—	—	—	X	—	—	—	X	X	X	X	—	—	X	—
2A-B-19	X	X	—	—	—	X	—	—	—	X	—	—	—	—	—	X	—
2A-W-1	X	X	—	X	—	X	—	—	—	X	—	—	—	—	—	—	—
2A-W-2	—	X	—	X	—	—	—	—	—	X	—	—	—	X	—	X	—
2A-W-3	—	X	—	—	—	X	—	—	—	X	X	X	X	—	—	—	—
2A-W-4	—	X	—	—	—	X	—	—	—	X	X	X	X	—	—	X	—
2A-W-5 (***)	X	X	—	—	X	X	—	—	—	X	X	X	X	—	—	X	—
2A-W-6	—	X	—	—	—	X	—	—	—	X	X	X	X	—	—	X	—
2A-W-7	—	X	—	—	—	—	—	—	—	X	X	X	X	—	—	X	—
2A-W-8	—	X	—	—	—	X	—	—	—	—	—	—	—	—	—	X	—
2A-W-9	—	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
2A-W-10	—	X	—	—	—	X	X	—	—	X	X	X	X	—	—	—	—
2A-W-11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Grid Samples (33)	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Contingency Grid Samples (27)	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 3-3 Soil and Sediment Sampling Summary

Sample Location ID	Sampling Details																
	Surface				Vadose				Smear Zone								Below Smear Zone
	Pb, As	NWTPH-Dx	Dioxins	PCB	Pb, As	NWTPH-Dx	PCB	TOC	Pb, As	NWTPH-Dx	PAH	BTEX	EPH/VPH	PCB	Pb, As	NWTPH-Dx	PCB
Section 2B																	
2B-B-1	X	X	—	—	—	—	—	X	—	X	—	—	—	—	—	X	—
2B-B-2 (*)	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	X	—
2B-B-4 (*)	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
2B-B-5	—	X	—	—	—	—	—	—	—	X	—	—	—	—	—	X	—
2B-W-4	X	X	—	—	—	—	—	—	—	X	—	—	—	—	—	X	—
2B-SD-1 (**)	X	X	—	X	X	X	X	—	—	—	—	—	—	—	—	—	—
2B-SD-2 (**)	X	X	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—
2B-SD-3 (**)	X	X	—	X	X	X	X	—	X	X	X	—	X	X	—	—	—
2B-SD-4 (**)	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
2B-SD-5 (**)	—	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
2B-SD-6 (**)	—	X	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
2B-SS-3	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2B-SS-5	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2B-SS-6	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Section 3																	
3-B-1 (****)	X	X	X	X	—	X	X	—	—	X	—	—	—	X	—	X	X
3-B-2	—	X	—	X	—	X	X	—	—	X	X	X	X	X	—	X	—
3-B-3	—	X	—	X	—	X	X	—	—	X	—	X	—	X	—	X	X
3-SD-1 (**)	X	X	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—
3-SS-2	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Section 4																	
4-B-1	X	X	—	X	—	—	—	—	—	X	X	—	—	X	—	X	X
4-SS-1	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4-SS-3	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4-SS-4	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4-SS-5	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4-SS-7	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4-SS-8	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4-SS-9	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Grid Samples (9)	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Contingency grid samples (1)	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Section 5																	
5-B-1 (*)	—	X	—	—	—	X	—	—	—	X	—	—	—	—	—	X	—
5-B-2 (*)	—	X	—	X	—	—	—	—	—	X	—	—	—	X	—	X	—
5-B-3	—	X	—	—	—	X	—	X	—	X	—	—	—	—	—	X	—
5-B-4	X	X	—	X	—	—	—	—	—	X	—	—	—	X	—	X	—
5-B-5	X	—	—	—	—	—	—	—	—	X	—	—	—	—	X	X	—
5-B-6	X	X	—	—	—	—	—	X	—	X	—	—	—	—	—	X	—
5-SS-1	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-2	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-3	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-4	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-5	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-6	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-7	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-8	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-9	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-10	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-11	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-13	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-14	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-15	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-16	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-17	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-50	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-SS-55	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5-W-1	—	X	—	X	—	—	—	—	—	X	—	—	—	—	—	X	—
5-W-2	—	X	—	—	—	X	—	—	—	X	X	X	X	—	—	X	—
5-W-3	—	—	—	—	—	—	—	—	—	X	X	X	—	—	—	X	—
5-W-4 (*)	—	—	—	X	—	X	—	—	—	X	X	X	X	—	—	X	—
5-SD-1 (**)	X	X	—	X	X	X	X	X	—	—	—	—	—	—	—	—	—
PZ-1 (***)	X	—	—	—	—	X	—	X	—	X	X	X	X	—	—	X	—
PZ-3	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PZ-4 (***)	X	—	—	X	—	X	—	X	—	X	X	X	X	—	—	X	—
PZ-5 (***)	X	—	—	—	—	X	—	X	—	X	X	X	X	—	—	X	—
Grid Samples (4)	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Notes:

* Contingent sample locations.

** Samples will be collected at 2.5-foot intervals to 15 feet or refusal.

*** Samples will be from 2.5 feet bgs to base of contamination, at 2.5-foot intervals.

**** PCB sample collected at 2.5-foot intervals to 10 feet.

X - Sample collected.

"—" - Sample not collected.

Table 3-4 Skykomish River Sediment Collection

Station ID	Collection Date	Latitude	Longitude	Purpose	Sulfides	TS, TVS, TOC, NH3	Grain Size	TPH	Bioassay	Ecology Split
SED-10	7/10/2001	47 41 36.57	122 49 29.03	Downstream of seeps to determine the extent of contamination	X	X	X	X	X	N
SED-11	7/10/2001	47 41 37.20	122 49 27.05	Seep Area, most downstream	X	X	X	X	X	N
SED-12	7/10/2001	47 41 37.58	122 49 25.93	Seep Area, second most downstream	X	X	X	X	X	Y
SED-13	7/10/2001	47 41 38.29	122 49 24.01	Seep Area, second most upstream	X	X	X	X	X	Y
SED-14	7/10/2001	47 41 38.61	122 49 22.91	Seep Area, most upstream	X	X	X	X	X	Y
SED-16	7/10/2001	47 41 40.86	122 49 19.76	Reference upstream, unimpacted area	X	X	X	X	X	Y

Table 3-5 Skykomish River Water Levels

Date	Time (hours:minutes)	Depth (ft)	Flow (cfs)
<i>River Gauge, Gold Bar, Washington</i>			
7/10/2001	—	5.13	2,210
7/19/2001	—	4.47	1,470
<i>5th Avenue Bridge, Skykomish, Washington</i>			
7/10/2001	10:00	4.4	—
	10:15	4.4	—
	10:30	4.41	—
	10:45	4.39	—
	11:00	4.38	—
	11:15	4.39	—
	11:30	4.41	—
	11:45	4.35	—
	12:00	4.26	—
	12:15	4.34	—
	12:30	4.32	—
	12:45	4.34	—
	13:00	4.27	—
	13:15	4.35	—
	13:30	4.31	—
	13:45	4.30	—
	14:00	4.32	—
7/19/2001	10:00	3.99	—
	10:15	—	—
	10:30	3.91	—
	10:45	3.99	—
	11:00	3.95	—
	11:15	3.92	—
	11:30	3.97	—
	11:45	3.96	—
	12:00	3.94	—
	12:15	3.94	—
	12:30	3.92	—
	12:45	3.97	—
	13:00	3.94	—
	13:15	3.87	—
	13:30	3.90	—
	13:45	3.88	—
	14:00	3.93	—

Note:

"—" - No data available.

Table 3-6 Skykomish River Sediment Collection Parameters

Station ID	Collection Date	Time	Sample Method	Maximum Water Depth (inches)	Maximum Recovery Depth (cm)	Distance of Sediments Collected Above Water Line (inches)	Length of Sample Area Along Bank (feet)	No. of Grabs	No. of Attempts	Petroleum Odor	Presence of Product Droplets	Sheen	Composite Description	Other Observations	DO (mg/L)	Temp (°C)
SED-10	7/10/2001	11:50	Spoon	6	2	0.2	14.0	4	4	None	None	None	Loose, wet, gray-brown slightly silty medium to fine sand with 10% organic material, trace well rounded gravel, and trace of coarse sand	Leech, caddis fly, salmon fry along banks	9.1	14.1
SED-11	7/10/2001	12:50	Spoon	2	6	2.5	16.0	4	4	None	Trace	Trace	Loose, wet, grayish tan, fine to medium sand with trace fines and well rounded gravel (< 5 mm); 15% undecomposed twigs	Chironomids, approximately 10 salmon fry	10	14.7
SED-12	7/10/2001	14:30	Spoon	2	1.5	4.0	25.0	5	5	Heavy	Abundant	Heavy	Loose, wet, gray brown with dark brown tarry splotches, medium to fine sand, slightly silty with 20% organic fraction (twigs, mossy fibrous material and roots); water stained and tar-like	Heavily stained bowl	9.7	15
SED-13	7/10/2001	15:50	Spoon	4	8	2.0	19.0	2	2	Moderate	Abundant	Heavy	Tarry, sticky, dark gray fine sand with 25% organic material	Heavily stained bowl	8.9	16.3
SED-14	7/10/2001	17:25	Spoon	2	8	2.0	26.0	4	4	Moderate	Abundant	Heavy	Loose, wet, dark grayish brown, slightly silty fine to medium sand, 10% organic material	Slightly stained bowl	8.7	16.5
SED-16	7/10/2001	17:15	Spoon	6	8	2.0	10.0	3	3	None	None	None	Loose, wet, medium to light brown medium to fine sand with trace roots and 30% fines	Earthworm	—	—

Table 3-7 Skykomish Well Construction Table: All Investigations

Well Name	Date Installed	Ground Surface Elevation (ft-msl)	MP Elevation (ft-msl)	Total Well Depth (ft)	Surface Completion*	Riser Stickup	Diameter (in)	Well Material	Screen Slot Size (in)	Screen Interval Depth (ft)	Concrete Interval (ft)	Seal Material	Surface Seal Interval (ft)	Sand Pack	Sand Pack Interval (ft)	Depth to Water During Installation (ft)
Supplemental RI Wells																
1A-W-1	12/5/01	935.75	935.49	22	heavy-duty flush-mount monument	0.26	2	Schedule 40 PVC	0.020	7–22	0–4	3/8" bentonite chips	4–5.5	10/20 silica sand	5.5–22	12.5
1A-W-2	12/4/01	935.74	935.31	25	standard flush-mount monument	0.43	2	Schedule 40 PVC	0.020	8.5–23.5	0–4	3/8" bentonite chips	4–6.5 & 23.5–25	10/20 silica sand	6.5–23.5	12
1A-W-3	12/6/01	928.34	927.98	17	heavy-duty flush-mount monument	0.36	2	Schedule 40 PVC	0.020	6–16.5	0–4	3/8" bentonite chips	4–5	10/20 silica sand	5–16.5	8
1A-W-4	12/5/01	929.56	929.19	23	heavy-duty flush-mount monument	0.37	2	Schedule 40 PVC	0.020	8–23	0–4	3/8" bentonite chips	4–7	10/20 silica sand	7–23	10
1B-W-1	12/7/01	935.94	935.52	23	heavy-duty flush-mount monument	0.42	2	Schedule 40 PVC	0.020	7.5–22.5	0–4	3/8" bentonite chips	4–6.5	10/20 silica sand	6.5–22.5	10
1B-W-2	1/8/02	936.14	935.81	20	standard flush-mount monument	0.33	2	Schedule 40 PVC	0.020	7–17	0–4	3/8" bentonite chips	4–5.5 & 17–20	10/20 silica sand	5.5–17	7.5
1B-W-3	12/19/01	937.02	936.66	22	heavy-duty flush-mount monument	0.36	2	Schedule 40 PVC	0.020	7–22	0–4	3/8" bentonite chips	4–6	10/20 silica sand	6–22	12.5
1C-W-1	12/17/01	936.74	936.44	20	standard flush-mount monument	0.3	2	Schedule 40 PVC	0.020	7–17	0–4	3/8" bentonite chips	4–5 & 17–20	10/20 silica sand	5–17	9
1C-W-2	12/10/01	935.63	935.29	23	heavy-duty flush-mount monument	0.34	2	Schedule 40 PVC	0.020	8–23	0–4	3/8" bentonite chips	4–7	10/20 silica sand	7–23	10.5
2A-W-1	12/6/01	934.21	933.87	23	heavy-duty flush-mount monument	0.34	2	Schedule 40 PVC	0.020	8–23	0–4	3/8" bentonite chips	4–6	10/20 silica sand	6–23	8
2A-W-2	12/8/01	935.85	935.55	16.5	heavy-duty flush-mount monument	0.3	2	Schedule 40 PVC	0.020	6–16	0–4	3/8" bentonite chips	4–5, 7 & 16.5–20	10/20 silica sand	5–16.5	11
2A-W-3	12/12/01	934.92	934.43	25	standard flush-mount monument	0.49	2	Schedule 40 PVC	0.020	8–23	0–4	3/8" bentonite chips	4–7 & 23–25	10/20 silica sand	7–23	8.5
2A-W-4	12/16/01	935.68	938.21	22	stickup steel casing w/ 3 steel bollard posts	2.53	2	Schedule 40 PVC	0.020	7–17	0–4	3/8" bentonite chips	4–5 & 17–22	10/20 silica sand	5–17	8
2A-W-5	12/9/01	937.07	939.47	23	stickup steel casing w/ 3 steel bollard posts	2.4	2	Schedule 40 PVC	0.020	6.5–16.5	0–4	3/8" bentonite chips	4–5.5 & 16.5–23	10/20 silica sand	5.5–16.5	9.5
2A-W-6	12/9/01	935.55	935.32	23	standard flush-mount monument	0.23	2	Schedule 40 PVC	0.020	8–23	0–4	3/8" bentonite chips	4–7 & 23–24	10/20 silica sand	7–23	10
2A-W-7	12/12/01	938.19	940.59	23	stickup steel casing w/ 3 steel bollard posts	2.4	2	Schedule 40 PVC	0.020	8–23	0–4	3/8" bentonite chips	4–7	10/20 silica sand	7–23	12
2A-W-8	12/12/01	940.02	942.62	22	stickup steel casing w/ 3 steel bollard posts	2.6	2	Schedule 40 PVC	0.020	7–22	0–4	3/8" bentonite chips	4–6	10/20 silica sand	6–22	14
2A-W-9	12/18/01	934.28	936.58	20	stickup steel casing w/ 3 steel bollard posts	2.3	2	Schedule 40 PVC	0.020	7–17	0–4	3/8" bentonite chips	4–6 & 17–20	10/20 silica sand	6–17	12.5
2A-W-10	12/12/01	935.55	938	22	stickup steel casing w/ 3 steel bollard posts	2.45	2	Schedule 40 PVC	0.020	7–17	0–4	3/8" bentonite chips	4–6 & 17–20	10/20 silica sand	6–17	4
2A-W-11	12/17/01	930.79	933.59	17	stickup steel casing w/ 3 steel bollard posts	2.8	2	Schedule 40 PVC	0.020	7–17	0–4	3/8" bentonite chips	4–6	10/20 silica sand	6–17	3.5
2B-W-4	12/17/01	931.33	931.03	20	standard flush-mount monument	0.3	2	Schedule 40 PVC	0.020	7–17	0–4	3/8" bentonite chips	4–5 & 17–20	10/20 silica sand	5–17	1

Table 3-7 Skykomish Well Construction Table: All Investigations

Well Name	Date Installed	Ground Surface Elevation (ft-msl)	MP Elevation (ft-msl)	Total Well Depth (ft)	Surface Completion*	Riser Stickup	Diameter (in)	Well Material	Screen Slot Size (in)	Screen Interval Depth (ft)	Concrete Interval (ft)	Seal Material	Surface Seal Interval (ft)	Sand Pack	Sand Pack Interval (ft)	Depth to Water During Installation (ft)
Supplemental RI Wells (Continued)																
5-W-1	12/8/01	928.81	928.37	16.5	heavy-duty flush-mount monument	0.44	2	Schedule 40 PVC	0.020	6-16	0-4	3/8" bentonite chips	4-5	10/20 silica sand	5-16.5	7
5-W-2	12/15/01	926.82	926.37	22	standard flush-mount monument	0.45	2	Schedule 40 PVC	0.020	7-22	0-4	3/8" bentonite chips	4-6	10/20 silica sand	6-22	5
5-W-3	12/11/01	925.54	925.21	20	standard flush-mount monument	0.33	2	Schedule 40 PVC	0.020	7-17	0-4	3/8" bentonite chips	4-6 & 17-20	10/20 silica sand	6-17	6
5-W-4	12/9/01	925.96	925.66	16.5	heavy-duty flush-mount monument	0.3	2	Schedule 40 PVC	0.020	6-16	0-4	3/8" bentonite chips	4-6	10/20 silica sand	5-16.5	9.5
September 2001																
MW-44	9/22/01	924.43	923.9	19	heavy-duty flush-mount monument	0.53	4	Schedule 40 PVC	0.020	4-19	0-2	3/8" bentonite chips	2-3.5	2/12 silica sand	3.5-19	12
MW-45	9/21/01	924.7	924.2	19	heavy-duty flush-mount monument	0.5	4	Schedule 40 PVC	0.020	4-19	0-2	3/8" bentonite chips	2-3.5	2/12 silica sand	3.5-19	8
MW-46	9/23/01	925.94	925.47	19	heavy-duty flush-mount monument	0.47	4	Schedule 40 PVC	0.020	4-19	0-2	3/8" bentonite chips	2-3.5	2/12 silica sand	3.5-19	10
PZ-1	9/20/01	924.55	924.2	19	standard flush-mount monument	0.35	2	Schedule 40 PVC	0.020	4-19	0-2	3/8" bentonite chips	2-3.5	2/12 silica sand	3.5-19	11
PZ-3	9/21/01	925.62	925.05	19	heavy-duty flush-mount monument	0.57	2	Schedule 40 PVC	0.020	4-19	0-2	3/8" bentonite chips	2-3.5	2/12 silica sand	3.5-19	8
PZ-4	9/22/01	925.79	925.2	19	heavy-duty flush-mount monument	0.59	2	Schedule 40 PVC	0.020	4-19	0-2	3/8" bentonite chips	2-3.5	2/12 silica sand	3.5-19	11
PZ-5	9/20/01	927.62	926.95	19	heavy-duty flush-mount monument	0.67	2	Schedule 40 PVC	0.020	4-19	0-2	3/8" bentonite chips	2-3.5	2/12 silica sand	3.5-19	8.5
RW-8	9/26/01	926.95	926.71	24	standard flush-mount monument	0.24	8	Stainless Steel	0.040	4-19 w/ 5-ft sump	0-1.5	3/8" bentonite chips	1.5-3.5	3/8" pea gravel	3.5-24	13
RI Wells																
MW-1	9/17/90	938.30	941.08	20.50	stickup steel casing w/ steel bollard posts	2.78	2.00	Schedule 40 PVC	0.02	10.5-20.5	0-1	bentonite seal	1-7.5	medium sand	7.5-20.5	13.35
MW-2	9/18/90	936.80	939.73	20.00	stickup steel casing w/ steel bollard posts	2.93	2.00	Schedule 40 PVC	0.02	10-20	0-1	bentonite seal	1-5.75	medium sand	5.75-20	11.57
MW-3	9/18/90	936.60	939.17	19.50	stickup steel casing w/ steel bollard posts	2.57	2.00	Schedule 40 PVC	0.02	6-19.5	0-1	bentonite seal	1-4	medium sand	4-20.5	11.50
MW-4	9/18/90	935.60	938.12	19.00	stickup steel casing w/ steel bollard posts	2.52	2.00	Schedule 40 PVC	0.02	6-19	0-1	bentonite seal	1-4	medium sand	4-20	10.69
MW-5	9/19/90	932.10	934.84	14.00	stickup steel casing w/ steel bollard posts	2.74	2.00	Schedule 40 PVC	0.02	4-14	0-1	bentonite seal	1-3	medium sand	3-14.5	7.96
MW-6	9/19/90	936.50	938.97	20.50	stickup steel casing w/ steel bollard posts	2.47	2.00	Schedule 40 PVC	0.02	9-19	0-1	bentonite seal	1-5.75	medium sand	5.75-20.5	13.64
MW-7	9/19/90	934.40	937.01	19.00	stickup steel casing w/ steel bollard posts	2.61	2.00	Schedule 40 PVC	0.02	5-19	0-1	bentonite seal	1-4	medium sand	4-20.5	12.19
MW-8	9/19/90	935.30	937.75	19.00	stickup steel casing w/ steel bollard posts	2.45	2.00	Schedule 40 PVC	0.02	9-19	0-1	bentonite seal	1-4	medium sand	4-20.5	13.17

Table 3-7 Skykomish Well Construction Table: All Investigations

Well Name	Date Installed	Ground Surface Elevation (ft-msl)	MP Elevation (ft-msl)	Total Well Depth (ft)	Surface Completion*	Riser Stickup	Diameter (in)	Well Material	Screen Slot Size (in)	Screen Interval Depth (ft)	Concrete Interval (ft)	Seal Material	Surface Seal Interval (ft)	Sand Pack	Sand Pack Interval (ft)	Depth to Water During Installation (ft)
<i>RI Wells (Continued)</i>																
MW-9	9/20/90	936.20	938.86	19.00	stickup steel casing w/ steel bollard posts	2.66	2.00	Schedule 40 PVC	0.02	7-19	0-1	bentonite seal	1-5	medium sand	5-20.5	13.23
MW-10	9/20/90	936.70	939.60	19.00	stickup steel casing w/ steel bollard posts	2.90	2.00	Schedule 40 PVC	0.02	7-19	0-1	bentonite seal	1-5	medium sand	5-20.5	12.61
MW-11	9/20/90	937.50	939.95	19.00	stickup steel casing w/ steel bollard posts	2.45	2.00	Schedule 40 PVC	0.02	9-19	0-1	bentonite seal	1-4	medium sand	4-20.5	13.47
MW-12	9/20/90	930.50	933.08	14.00	stickup steel casing w/ steel bollard posts	2.58	2.00	Schedule 40 PVC	0.02	4-14	0-1	bentonite seal	1-3	medium sand	3-15.5	6.93
MW-13	9/20/90	933.90	936.56	14.00	stickup steel casing w/ steel bollard posts	2.66	2.00	Schedule 40 PVC	0.02	4-14	0-1	bentonite seal	1-3	medium sand	3-15.5	10.68
MW-14	9/21/90	934.30	936.91	14.00	stickup steel casing w/ steel bollard posts	2.61	2.00	Schedule 40 PVC	0.02	4-14	0-1	bentonite seal	1-3	medium sand	3-15.5	11.52
MW-15	9/21/90	934.60	937.26	19.00	stickup steel casing w/ steel bollard posts	2.66	2.00	Schedule 40 PVC	0.02	7-19	0-1	bentonite seal	1-5	medium sand	5-20.5	12.68
MW-16	9/21/90	932.60	935.35	19.50	stickup steel casing w/ steel bollard posts	2.75	2.00	Schedule 40 PVC	0.02	7-19.5	0-1	bentonite seal	1-5	medium sand	5-19.5	14.08
MW-17	9/24/90	936.60	939.26	19.00	stickup steel casing w/ steel bollard posts	2.66	2.00	Schedule 40 PVC	0.02	7-19	0-1	bentonite seal	1-4	medium sand	4-20.5	11.57
MW-18	9/24/90	938.10	940.98	19.00	stickup steel casing w/ steel bollard posts	2.88	2.00	Schedule 40 PVC	0.02	4-19	0-1	bentonite seal	1-3	medium sand	3-20.5	13.68
MW-19	9/26/90	930.00	932.91	14.00	stickup steel casing w/ steel bollard posts	2.91	2.00	Schedule 40 PVC	0.02	4-14	0-0.25	bentonite seal	0.25-2	medium sand	2-14.5	10.51
MW-20	9/26/90	934.54	NA	19.00	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.02	9-19	0-1	bentonite seal	1-2	medium sand	2-20.5	12.84
MW-21	9/25/90	936.10	938.91	19.00	stickup steel casing w/ steel bollard posts	2.81	2.00	Schedule 40 PVC	0.02	9-19	0-1	bentonite seal	1-5.75	medium sand	5.75-20	13.06
MW-22	9/24/90	925.80	NA	14.00	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.02	4-14	0-1	bentonite seal	1-3	medium sand	3-15.5	4.66
MW-23	9/25/90	926.36	NA	14.00	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.02	2-14	0-1	bentonite seal	1.1.25	medium sand	1.25-15.5	9.00
MW-24	9/25/90	926.60	NA	14.00	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.02	2-14	0-1	bentonite seal	1.1.25	medium sand	1.25-15.5	9.09
MW-25	9/25/90	927.01	NA	14.00	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.02	2-14	0-1	bentonite seal	1.1.25	medium sand	1.25-15.5	9.57
MW-26	9/26/90	930.99	NA	19.00	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.02	4-19	0-1	bentonite seal	1-3	medium sand	3-20.5	10.71
MW-27	9/26/90	936.47	NA	19.00	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.02	7-19	0-1	bentonite seal	1-5	medium sand	5-20.5	14.10
MW-28	11/4/91	939.20	941.50	18.50	stickup steel casing w/ steel bollard posts	2.30	2.00	Schedule 40 PVC	0.02	3.5-18.5	0-1	bentonite seal	1-2.5	medium sand	2.5-20	11.94
MW-29	11/5/91	945.90	948.81	23.00	stickup steel casing w/ steel bollard posts	2.91	2.00	Schedule 40 PVC	0.02	3.5-23	0-1	bentonite seal	1-2.5	medium sand	2.5-23	16.32

Table 3-7 Skykomish Well Construction Table: All Investigations

Well Name	Date Installed	Ground Surface Elevation (ft-msl)	MP Elevation (ft-msl)	Total Well Depth (ft)	Surface Completion*	Riser Stickup	Diameter (in)	Well Material	Screen Slot Size (in)	Screen Interval Depth (ft)	Concrete Interval (ft)	Seal Material	Surface Seal Interval (ft)	Sand Pack	Sand Pack Interval (ft)	Depth to Water During Installation (ft)
<i>RI Wells (Continued)</i>																
MW-30	11/6/91	929.60	932.20	18.50	stickup steel casing w/ steel bollard posts	2.60	2.00	Schedule 40 PVC	0.02	3.5–18.5	0–1	bentonite seal	1–2.5	medium sand	2.5–20	12.45
MW-31	11/6/91	931.40	934.44	18.50	stickup steel casing w/ steel bollard posts	3.04	2.00	Schedule 40 PVC	0.02	3.5–18.5	0–1	bentonite seal	1–2	medium sand	2–20	11.79
MW-32	11/8/91	923.00	926.46	9.40	stickup steel casing w/ steel bollard posts	3.46	2.00	Schedule 40 PVC	0.02	1.5–9.4	0–1	natural soil backfill	9.4–10	medium sand	1–9.4	6.45
MW-33	9/28/93	934.34	NA	20.54	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.01	5.54–20	0–2	3/8" bentonite chips	2–4	10/20 silica sand	4–20.5	12.00
MW-34	10/23/93	935.99	NA	20.78	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.01	5.65–20.05	0–2	3/8" bentonite chips	2–4	10/20 silica sand	4–21	14.00
MW-35	10/19/93	936.48	NA	20.73	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.01	5.48–19.9	0–2	3/8" bentonite chips	2–4	10/20 silica sand	4–21	17.00
MW-36	10/21/93	928.90	NA	20.94	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.01	5.69–20.13	0–2	3/8" bentonite chips	2–4 & 21–23	10/20 silica sand	4–21	7.00
MW-37	10/22/93	932.71	NA	20.88	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.01	5.63–20.05	0–2	3/8" bentonite chips	2–4 & 21–24.5	10/20 silica sand	4–21	9.00
MW-38	10/24/93	923.08	NA	20.90	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.01	5.67–20.07	0–2	3/8" bentonite chips	2–4	10/20 silica sand	4–21	9.00
MW-39	10/19/93	933.20	936.40	21.64	stickup steel casing w/ steel bollard posts	3.20	2.00	Schedule 40 PVC	0.01	6.43–20.97	0–2	3/8" bentonite chips	2–3	10/20 silica sand	3–22.5	9.00
MW-40	9/27/93	933.50	936.87	17.68	stickup steel casing w/ steel bollard posts	3.37	2.00	Schedule 40 PVC	0.01	5.02–17.64	0–2	3/8" bentonite chips	2–4	10/20 silica sand	4–18	13.00
MW-41	10/26/95	NA	NA	20.50	standard flush-mount monument	NA	4.00	Schedule 40 PVC	0.02	5–19.7	0.0–1.0	bentonite chips	1.0–3.0	10/20 silica sand	3.0–20.5	5.50
MW-42	8/28/96	924.26	NA	20.00	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.02	3–18	0.1	bentonite chips	1.0–2.25	10/20 silica sand	2.25–20	7.00
MW-43	8/29/96	923.45	NA	20.00	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.02	3–18	0–1	bentonite chips	1.0–2.25	10/20 silica sand	2.25–20	7.00
DW-1	9/28/93	940.10	943.52	36.58	stickup steel casing w/ steel bollard posts	3.42	2.00	Schedule 40 PVC	0.01	31.29–35.77	0–2	volclay grout/slough	2–26.75 & 36–37.25	10/20 silica sand	26.75–36	18.00
DW-2	9/27/93	933.20	935.88	44.02	stickup steel casing w/ steel bollard posts	2.68	2.00	Schedule 40 PVC	0.01	38.77–43.19	0–2	3/8" bentonite chips	2–36.75	10/20 silica sand	36.75–44	11.00
DW-3	9/29/93	928.30	930.88	43.73	stickup steel casing w/ steel bollard posts	2.58	2.00	Schedule 40 PVC	0.01	38.57–42.98	0–2	3/8" bentonite chips/volclay grout/slough	2–3, 3–36 & 44–45.5	10/20 silica sand	36–44	16.00
DW-4	10/21/93	925.18	NA	43.18	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.01	38.31–42.77	0–2	3/8" bentonite chips/volclay grout	2–3 & 3–36.5	10/20 silica sand	36.5–44	12.00
DW-5	10/23/93	932.91	NA	45.71	standard flush-mount monument	NA	2.00	Schedule 40 PVC	0.01	40.46–44.92	0–3	3/8" bentonite chips/volclay grout	3–5 & 5–38	10/20 silica sand	38–45.7	15.00

Table 3-7 Skykomish Well Construction Table: All Investigations

Well Name	Date Installed	Ground Surface Elevation (ft-msl)	MP Elevation (ft-msl)	Total Well Depth (ft)	Surface Completion*	Riser Stickup	Diameter (in)	Well Material	Screen Slot Size (in)	Screen Interval Depth (ft)	Concrete Interval (ft)	Seal Material	Surface Seal Interval (ft)	Sand Pack	Sand Pack Interval (ft)	Depth to Water During Installation (ft)
<i>RI Wells (Continued)</i>																
R-1	10/27/95	NA	NA	21.00	concrete vault	NA	6.00	Stainless Steel	0.020 wire wrap	4–19	0–3	bentonite chips	3–3.5	10/20 silica sand	3.5–21	5.00
R-2	10/26/95	NA	NA	21.00	concrete vault	NA	6.00	Stainless Steel	0.020 wire wrap	4–19	0–3	bentonite chips	3–3.5	10/20 silica sand	3.5–21	5.50
R-3	10/27/95	NA	NA	21.00	concrete vault	NA	6.00	Stainless Steel	0.020 wire wrap	4–19	0–3	bentonite chips	3–3.5	10/20 silica sand	3.5–21	6.00
R-4	10/26/95	NA	NA	23.00	concrete vault	NA	6.00	Stainless Steel	0.020 wire wrap	4–19	0–3	bentonite chips	3–3.5	10/20 silica sand	3.5–23	6.00

Notes:

* Top of steel on stickup completions is the top of the well cap. Subtract 0.03 foot to top of steel casing.

ft-msl - Feet above mean sea level.

MP - Measuring Point.

NA - Not applicable.

Table 3-8 Groundwater Sampling Summary

Well ID	Sampling Requirements (**)				
	TPH	PCB	PAHs	BTEX	EPH/VPH
Section 1A					
1A-W-1	—	—	—	—	—
1A-W-2	—	—	—	—	—
1A-W-3	X	—	X	X	X
1A-W-4	X	—	X	X	X
Section 1B					
1B-W-1	—	—	—	—	—
1B-W-2	X	—	X	X	X
1B-W-3 (*)	X	—	X	X	—
Section 1C					
1C-W-1	X	—	—	—	—
1C-W-2	X	—	X	X	X
MW-34	X	—	—	—	—
MW-35	X	—	—	—	—
Section 2A					
2A-W-1	X	—	X	X	X
2A-W-2	—	—	—	—	—
2A-W-3	X	—	X	X	X
2A-W-4	X	—	X	X	X
2A-W-5	X	—	X	X	X
2A-W-6	X	—	X	X	X
2A-W-7	X	—	X	X	X
2A-W-8	X	—	—	—	—
2A-W-9	X	—	X	X	X
2A-W-10	X	—	X	X	X
2A-W-11	X	—	X	X	X
MW-1	X	—	—	—	—
MW-2	X	—	—	—	—
MW-3	X	—	—	—	—
MW-4	X	—	—	—	—
MW-5	X	—	X	X	—
MW-7	X	—	X	X	—
MW-9	X	—	X	X	—
MW-10	X	—	—	—	—
MW-11	X	—	X	X	—
MW-12	X	—	—	—	—
MW-13	X	—	X	X	—
MW-14	X	—	—	—	—
MW-15	X	—	—	—	—
MW-18	—	—	—	—	—
MW-40	X	—	—	—	—
Section 2B					
2B-W-4	X	—	X	X	X
Section 4					
MW-16	—	—	—	—	—
MW-31	X	—	X	X	—
Section 5					
5-W-1	—	—	—	—	—
5-W-2	X	—	X	X	X
5-W-3	—	—	—	—	—
5-W-4 (*)	X	—	X	X	—
MW-19	X	—	—	—	—
MW-23	X	—	X	X	—
MW-24	X	—	—	—	—
MW-26	X	—	X	X	—
MW-32	—	X	—	—	—
MW-37	X	—	X	X	—
MW-39	X	—	—	—	X
MW-42	X	—	X	X	—
MW-43	X	—	—	—	—
MW-44	X	—	—	—	—
MW-45	X	—	—	—	—
MW-46	X	—	—	—	—
R-3	X	—	X	X	X

Notes:

* Contingency well, install if necessary to define the nature and extent of contamination.

** Note that the anticipated samples are based on the initial assumptions regarding the plume location.

Samples will only be collected from wells that do not contain LNAPL.

X - Sample collected.

"—" - Sample not collected.

Table 3-9 Summary of Quality Assurance Samples

Matrix	Trip Blank	Field Duplicates	Equipment Blanks	Matrix Spikes
Soil/Sediment	1 per cooler containing VOCs	1 per 10 samples	1 per 20 samples	1 per 20 samples
Water	1 per cooler containing VOCs	1 per 10 samples	1 per 20 samples	1 per 20 samples